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<b>(51) International Patent Classification <sup>6</sup> :</b> <b>B24D 3/26, 3/34, 11/00, B24B 37/04 //</b> <b>H01L 21/304</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/62673</b> <b>(43) International Publication Date:</b> 9 December 1999 (09.12.99)
<b>(21) International Application Number:</b> PCT/GB99/01515 <b>(22) International Filing Date:</b> 1 June 1999 (01.06.99)  <b>(30) Priority Data:</b> 60/087,742 2 June 1998 (02.06.98) US  <b>(71) Applicants (for all designated States except US):</b> SCAPA GROUP PLC [GB/GB]; Oakfield House, 93 Preston New Road, Blackburn, Lancashire BB2 6AY (GB). LAM RESEARCH CORPORATION [US/US]; 4650 Cushing Parkway, Fremont, CA 94538 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> LOMBARDO, Brian [US/US]; 11 Buckridge Drive, Amherst, NH 03031 (US). BAJAJ, Rajeev [IN/US]; 4827 Mendocino Terrace, Fremont, CA 94555 (US).  <b>(74) Agents:</b> PHILLIPS, Patricia, Marie et al.; Wilson Gunn M'Caw, 41-51 Royal Exchange, Cross Street, Manchester M2 7BD (GB).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> IMPROVED POLISHING PAD WITH REDUCED MOISTURE ABSORPTION  <b>(57) Abstract</b>  A polishing pad or belt or other device with increased resistance to moisture absorption for improved planarizing effectiveness and consistency. The relatively moisture resistant polishing pad contains additives to improve wetting of the pad surface for good slurry distribution.		

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## IMPROVED POLISHING PAD WITH REDUCED MOISTURE ABSORPTION

Cross Reference To Related Application

This is a complete application of provisional application Serial No. 60/087,742, filed June 2, 1998.

Background of the Invention

The purpose of this invention is to produce a polishing pad or belt or other device with increased resistance to moisture absorption for improved planarizing effectiveness and consistency.

Currently available polishing pads, typically polyurethane foam, are limited in effectiveness and consistency because they readily absorb moisture. In use, polishing pads are in continuous contact with aqueous slurries and cleaning solutions. Moisture absorption affects the performance of polishing pads in the following two ways:

- 1) Softening, swelling, or loss of rigidity through physical and chemical degradation, resulting in reduced planarizing effectiveness and reduced lifetime of the polishing pad,

- 2) Gradual changes in pad properties and integrity during use, resulting in unsteady and inconsistent performance.

Previous attempts to make polishing pads with reduced moisture absorption or with increased resistance to degradation have been limited because the pads are too hydrophobic, resulting in poor wetting, inefficient slurry distribution, and reduced removal rates. This invention overcomes that limitation in

generally hydrophobic polishing pads through the use of hydrophilic additives.

### Summary of the Invention

This invention comprises a relatively moisture resistant polishing pad with additives to improve wetting of the pad surface for good slurry distribution.

### Brief Description of the Invention

Although the descriptions of the invention refer to pads, the invention can be in any suitable form or shape, including but not limited to sheets, belts, disks, rollers and bobs.

The polishing pad matrix material can be any polymeric material or any combination of polymeric materials, including thermoplastic and cross-linked materials, that absorbs less than 4% moisture after soaking for 24 hours.

The polishing pad can include a porous structure. The porosity can be achieved by any suitable method, including but not limited to blowing, frothing, and inclusion of filled or unfilled hollow microelements. The pores can be any combination or distribution of size, shape, and quality (open or closed cell).

The polishing pad can include any type of texturing, formed naturally or by any suitable methods. The texturing can be created during the manufacturing process, or it can be created during use.

The additives suitable for improving wetting and

distribution of slurry include any type of hydrophilic additives like surfactants, and relatively polar polymeric materials including but limited to polyurethanes, polyamides, and polyesters. The additives can be liquid, solid, semi-solid, or combinations of solid and liquid. The additives can be reactive or non-reactive with the other materials in the polishing pad. The additives can be located within the polymer matrix or within the pores of the polishing material. The additives can be any shape, size, or distribution, and can perform additional functions (e.g., hydrophilic hollow beads used to increase wetting and to create porosity). The additives can remain in place and wear away with the polishing material, or they can pop out or smear to coat, fill in, or otherwise improve the interaction between the pad surface and slurry.

## We Claim:

1. A relatively moisture resistant polishing pad providing sufficient wetting of a pad surface for good slurry distribution comprising a polymeric matrix material and a hydrophilic or relatively polar polymeric additive.
2. The pad of claim 1 wherein the pad is in the form or shape of a sheet, belt, disk, roller or bob.
3. The pad of claim 1 wherein the polymeric material is thermoplastic or cross-linked material, that absorbs less than 4% moisture after soaking for 24 hours.
4. The pad of claim 1 wherein the pad is porous having open or closed cells.
5. The pad of claim 1 wherein the pad is textured.
6. The pad of claim 1 wherein the hydrophilic additive is a hydrophilic surfactant.
7. The pad of claim 1 wherein relatively polar polymeric additive is a polyurethane, polyamide or polyester.
8. The pad of claim 1 wherein the additive is liquid, solid, semi-solid, or a combination of solid and liquid.

9. The pad of claim 1 wherein the additive is reactive or non-reactive with the other materials in the pad.

10. The pad of claim 1 wherein the additive is located within the polymer matrix.

11. The pad of claim 4 wherein the additive is located within the pores of the pad.

12. The pad of claim 1 wherein the additive is a hydrophilic hollow bead used to increase wetting and to create porosity.

13. The pad of claim 1 wherein the additive remains in place or wears away with polishing, or pops out or smears to coat, fill in, or otherwise improve the interaction between the pad surface and a polishing slurry.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01515

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B24D3/26 B24D3/34 B24D11/00 B24B37/04 //H01L21/304

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B24D B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 613 345 A (THICKE RICKY P ET AL) 23 September 1986 (1986-09-23) column 1, line 44 - column 2, line 5 ---	1
A	US 4 728 552 A (JENSEN JR ELMER W) 1 March 1988 (1988-03-01) column 7, line 34 - line 59 -----	1

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/01515

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4613345	A	23-09-1986	NONE	
US 4728552	A	01-03-1988	NONE	

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